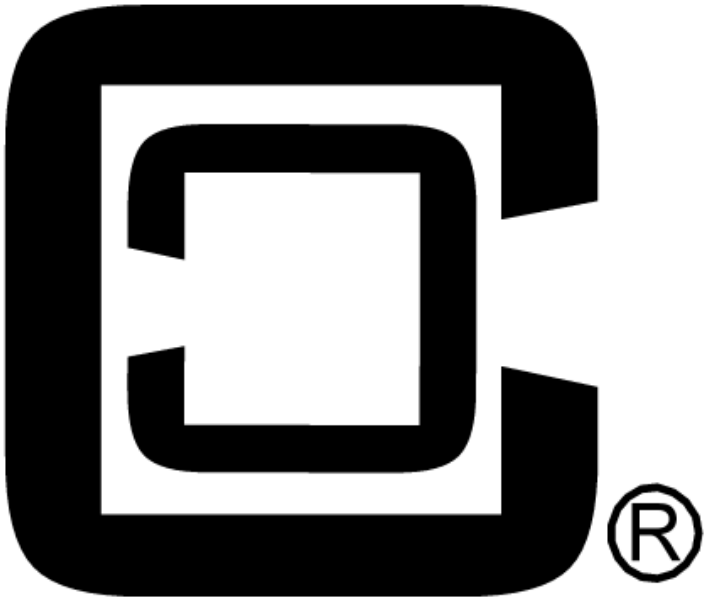
ClipperCreek, Inc.

Innovative Infrastructure for
Electric and Hybrid Vehicles



User's Manual

Model ACS

PLEASE NOTE

This user's manual includes the latest information at the time of printing. ClipperCreek, Inc. reserves the right to make changes to this product without further notice. Changes or modifications to this product by other than an authorized service facility may void the product warranty.

If you have questions about the use of this product, contact your customer service representative. Refer to the Customer Support section located in this guide.

Please visit ClipperCreek's Website @ www.clippercreek.net

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IMPORTANT SAFETY INSTRUCTIONS

Carefully read these instructions and the charging instructions in your vehicle owner's handbook before charging your electric vehicle.

The following symbols may be found in your handbook or on labels affixed to your conductive charge station:

Note *This means pay particular attention.* Notes contain helpful suggestions.

Caution *This symbol means be careful.* You are capable of doing something that might result in damage to equipment.

Warning *This symbol means danger.* You are in a situation that could cause bodily injury. Before you work on any electrical equipment, be aware of the hazards involved with electrical circuitry and standard practices for preventing accidents.

Instructions Pertaining to a Risk of Fire or Electric Shock

When using the the ACS, the following basic electrical safety precautions should be followed:

- Use this charge station to charge electric vehicles equipped with an *SAE-J1772[tm] charge port only*. See the vehicle's owner's handbook to determine if the vehicle is equipped with the correct charge port.
- Make certain the charge station's SAE-J1772™ charge cable is positioned so it will not be stepped on, tripped over, or otherwise subjected to damage or stress.
- There are no user serviceable parts inside. Refer to the Customer Support section in this manual for service information. Do not attempt to repair or service the charge station yourself.
- Do not operate your charge station if it or the SAE-J1772™ charge cable is physically open, cracked, frayed, or otherwise visibly damaged. Contact your Service Representative for service immediately. Refer to the Customer Support section in this manual for information on the Service Representative in your area.
- Do not place fingers inside of the coupler end of the SAE-J1772™ charge cable.
- Do not allow children to operate ths device. Adult supervision is mandatory when children are in proximity to a charge station that is in use.

Save these instructions for future reference.

SAFETY INFORMATION

Warning: Turn off input power to your charge station at the circuit breaker panel before servicing or cleaning the unit.

Note VENTILATION: Some electric vehicles require an external ventilation system to prevent the accumulation of hazardous or explosive gases when charging indoors. Check the vehicle's owner's handbook to determine if your vehicle requires ventilation during indoor charging.

Note Those vehicles which follow the SAE-J1772™ standard for communication with the charging station can inform the ACS that they require an exhaust fan. The ACS is not equipped to control ventilation fans. Do not charge your vehicle with the ACS if ventilation is required by your vehicle.

Caution: DO NOT charge your vehicle indoors if it requires ventilation. Contact your Service Representative for information.

FCC INFORMATION

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

This product has been designed to protect against Radio Frequency Interference (RFI). However there are some instances where high powered radio signals or nearby RF-producing equipment (such as digital phones, RF communications equipment, etc.) could affect operation.

If interference to your charge station is suspected, we suggest the following steps be taken before consulting your ClipperCreek Sales and Service Representative for assistance:

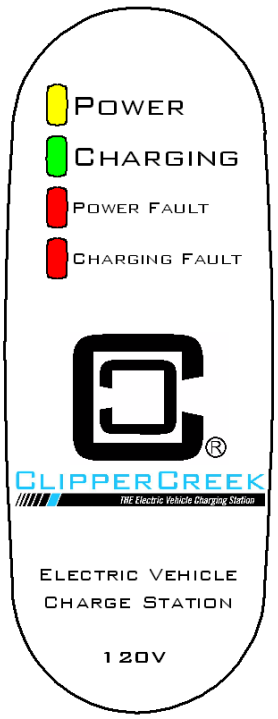
1. Reorient or relocate nearby electrical appliances or equipment during charging.
2. Turn off nearby electrical appliances or equipment during charging.

Caution Changes or modifications to this product by other than an authorized service facility may void FCC compliance.

OPERATION

The ACS Electric Vehicle Charging Station is a compact wall-mounted charging station that provides the Plug-in Hybrid or Battery Electric Vehicle (together Plug-In Electric Vehicles, or "PEV") user with a safe and manageable link between the power grid and the PEV.

Figure 1. The ACS Front Panel



The ACS is very easy to use. Just unwrap the SAE-J1772™ charge cable and plug the vehicle connector firmly into the vehicle's charge port.

Normally, the vehicle will immediately request a charge using a special communication line in the cable and within a few seconds the green Charging light will turn on and charging will begin. After an average driving day, the vehicle battery pack will require several hours to recharge completely. Charging overnight is the most convenient way to maintain healthy batteries and ensure the vehicle's full range will be available for the next day.

When the vehicle has stopped charging, the green Charging light will turn off. Remove the charge cable from the vehicle charge port. To interrupt a charge in progress, press and hold down the latch release lever on the charge cable handle, then remove the charge cable from the vehicle charge port.

FRONT PANEL

The front panel on the ACS has four indicator lights:

Power (yellow), indicates that power is available.

Charging (green), indicates that AC power is currently applied to the vehicle.

Power Fault (red), indicates that the ACS is not wired correctly. The problem can be due to improper grounding or a missing earth ground. The wiring should be examined by a qualified electrician.

Charging Fault (red), indicates that the ACS is unable to communicate with the vehicle correctly.

Table 1. Panel LED Information

#	Amber Power LED	Green Charging LED	Red Power Fault LED	Red Charging Fault LED	Fault Condition
1	off	off	off	off	No power to EVSE. Check circuit breaker.
2	ON	off	off	off	Not plugged into the EV or the EV is not ready to charge.
3	ON	ON	off	off	Charging enabled, power is applied to the vehicle
4	ON	off	ON – not blinking	off	* Improper grounding or ground is not present.
5	ON	off	off	ON – not blinking	* Problem with EV communications. Disconnect and restart.
6	ON	off	off	blinking	* EV ground fault trip. Check vehicle connection.
7	ON	off	blinking	blinking	* Internal EVSE fault. Call for service.

* The *ACS will automatically restart after 15 seconds*

INSTALLATION

Service Connections

Caution To reduce the risk of fire, connect only to a circuit provided with the appropriate maximum branch circuit overcurrent protection in accordance with the National Electrical Code, ANSI/NFPA 70.

For a model ACS-15, use a 15A circuit breaker

For a model ACS-20, use a 20A circuit breaker

For a model ACS-25, use a 25A circuit breaker

Caution **This is a single-phase device. Do not connect all 3 phases of a 3-phase feed !!!** You may use any one phase of a 3-phase wye-connected feed. The center-point of the 3 phases (usually used as Neutral) must be grounded somewhere in the system. A current-carrying Neutral as well as a Ground connection are required by the ACS, as shown in Figure 3.

Caution The phase used must measure 120V to Neutral. Earth Ground must be connected to Neutral at only one point, usually at the Service Entry Breaker Panel.

Caution If a 3-phase feed is from a Delta-connected secondary, the leg used must have a center-tap. That tap must be Grounded. Only a phase on either side of the center-tapped leg can be used. See Figure 4 below.

Caution **Warranty is void if this unit is wired improperly**

Warning Only a qualified electrician should perform the installation. The installation must be performed in accordance with all local electrical codes and ordinances.

Only 3 wires are connected, but care must be taken that the service transformer secondary connection is definitely known, and the 3 wires from the main circuit breaker panel are connected and labeled correctly. Figures 2, 3, and 4 below show the most common service transformer secondary wiring formats.

Notice that L1, Neutral & Ground are labeled on each diagram. Those transformer outputs correspond to the same inputs on the ACS. Also, each of the two 3-phase diagrams shows an L2 and an L3 output, which *are not used*. ***Do not connect more than one phase of a 3-phase secondary to the ACS. This is a single-phase device.***

The Neutral at the service panel *must* be connected to earth ground *somewhere* in the system on *any* of the three connection arrangements. Ground-fault protection is not possible unless the Neutral (center-tap on the service transformer) is connected to an earth ground. If no ground is provided by the electrical service, a grounding stake must be driven into the ground nearby, following local electrical codes. The grounding stake must be connected to the ground bar in the main breaker panel, and Neutral connected to ground at that point.

Warning Local electrical codes must always be followed when installing the grounding stake.

The following diagrams illustrate the 3 service transformer secondary connections most common in the United States.

Figure 2. 220/240V Single Phase

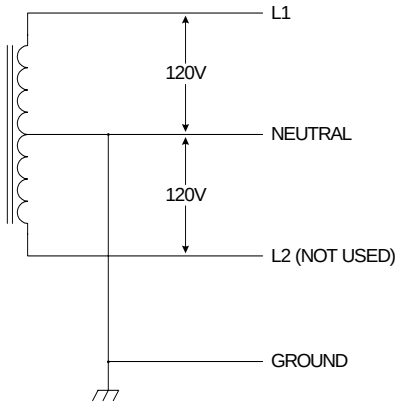
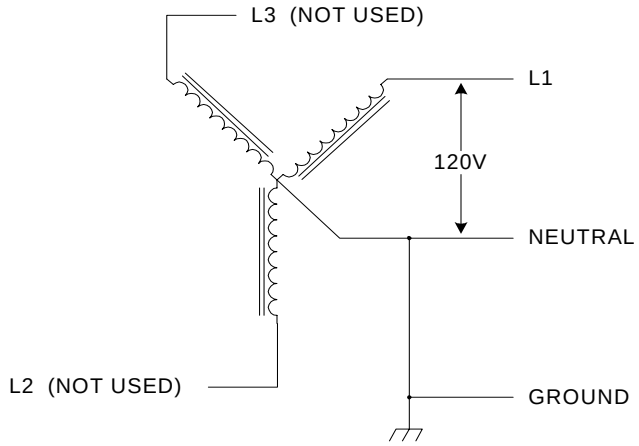
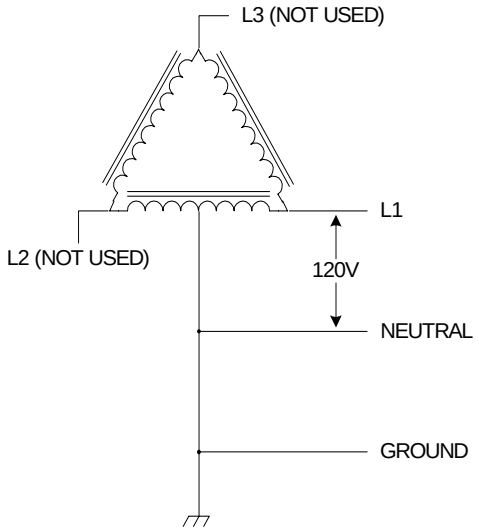


Figure 3. 208V 3-Phase, Wye-Connected



Note With a wye-connected secondary, any one of the three legs, in addition to neutral, can be used to provide 120V to the ACS. For example, L1 & Neutral, L2 & Neutral, or L3 & Neutral. Be sure the center point is grounded to earth somewhere in the system.

Figure 4. 240V 3-Phase, Delta-Connected, with center-tap on one leg.



Caution With the delta connection, one leg *must* be center-tapped, and *only* one of the two phases on either side of the center tap can be used. The phase used must measure 120V to neutral. The third line (L3) of the delta is 208V, with respect to neutral, and is sometimes referred to as a "stinger". ***Do not use this third line!*** Consult the transformer manufacturer's literature to be sure the single leg can supply the required power.

Caution A 3-phase delta-connected transformer secondary without a center-tap on one leg *is not usable with the ACS*. No "neutral" point is available to be connected to ground for ground-fault protection, and the ACS will not allow the contactor to close if it does not sense the presence of a ground wire connected to a "neutral" point on the transformer secondary.

Mounting Procedures

Locate the wall mounting position of the EVSE:

- The three ACS service conductors are shielded by a 3 foot flexible conduit. The ACS must be positioned such that this conduit can reach a nearby service panel or junction box.
- Position the bottom of the charge station at a comfortable height and at least 18 inches above the ground. Ensure that the LEDs on the front panel of the EVSE can clearly be seen by anyone who will be operating the device.
- The ACS has four mounting holes spaced in a 2" wide by 10" tall rectangular pattern. Use a template to mark hole locations on the wall.

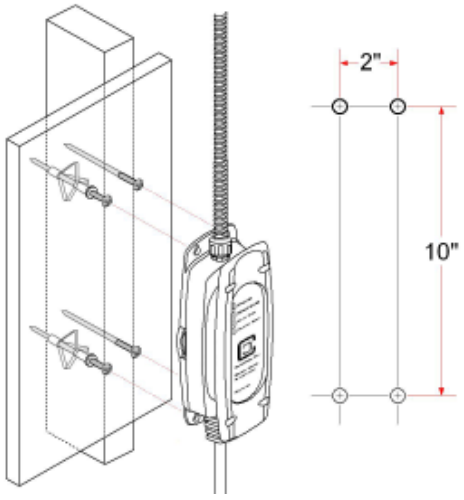
For Hollow-Wall Construction:

- Place the unit such that at least two (but preferrabley all four) mounting holes can take advantage of solid structural framing inside of the wall or a strong wall surface such as plywood.
- For any remaining mounting holes which do not have a solid mounting structure (such as drywall without a solid backing) it will be necessary to use proper anchoring hardware such as drywall toggles or molly bolts.

For Solid-Wall Construction:

- To secure the unit in concrete, pre-drill appropriately sized holes and use multi-set or wedge anchor hardware at all four mounting points.
- To secure the unit in brick or stone, pre-drill appropriately sized holes and use sleeve anchors at all four mounting points.

Figure 5. Mounting the ACS to a hollow wall

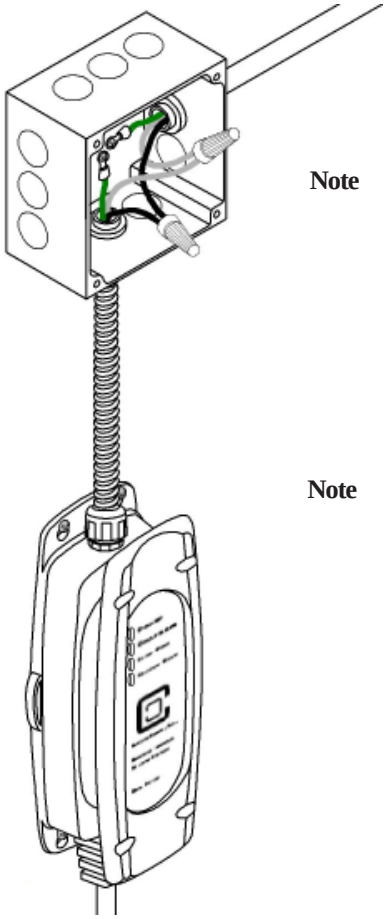


Machine screw size #10 hardware is recommended for mounting the ACS. Screw shafts of at least 2" are recommended. The ACS mounting holes are 3/16" in diameter, so ensure that the screw heads do not exceed this size. Place appropriately sized washers between the screw heads and the ACS enclosure mounting flanges.

Wiring Instructions

Route the ACS conduit to a nearby service panel or junction box. Use the included ¼" trade size watertight fitting to provide a moisture-resistant seal with the service panel or junction box. If necessary, drill a 1/2" diameter hole to accomodate the liquid-tight fitting or use the included 1/4" NPT to 1/2" NPT thread reducer kit.

Figure 6. Wiring the ACS in a junction box



Note Before connecting the ACS service conductors, please carefully read the section of this manual titled Service Connections, on page 5. If you are unsure of the type of power provided at the service panel, please consult with your local utility or call your Service Representative for assistance.

Note The three ACS service conductors use stranded 12AWG, 75ºC copper wire. The insulation of each conductor is color coded for standard 120VAC installation:

Green: Ground
Black: Line 1 (120VAC to Ground)
White: Neutral

SPECIFICATIONS

Line Input Power

Voltage & Wiring	120VAC single-phase - Line, Neutral, and Safety Ground.
Service Conductors	L1, Neutral, and Ground use 12AWG, 75ºC copper wire
Voltage Range:	85VAC to 132VAC
Frequency	60 Hz

Current

ACS Model	Circuit Breaker	Maximum Current
ACS-15	15A	10A or 12A
ACS-20	20A	15A or 16A
ACS-25	25A	20A

Note that the maximum current for the vehicle is set by the duty cycle of the Pilot waveform. Refer to the ACS serial number label for the specific factory-set maximum current rating.

Output Power Variable depending upon the ACS model and vehicle demand. At 120VAC, the ACS-15 outputs approximately 1.2KW (10A) or 1.4KW (12A), the ACS-20 1.8KW (15A) or 1.9KW (16A), and the ACS-25 2.4KW (20A).

Dimensions Dimensions are for the enclosure only

Height	280 mm (11 in)
Width	100 mm (4 in)
Depth	80 mm (3 in)

Weight 3 kg (7 lbs) with SAE-J1772™ connector and 20' cable

Environment

Operating Temperature	-30°C (-22°F) to +50°C (+122°F)
Enclosure Rating	NEMA 4X - watertight

Agency Approvals NRTL Listed, FCC Part 15 Class B

CUSTOMER SUPPORT

Call your ClipperCreek, Inc. Service Representative at any time, 24 hours a day, at the number below. **PLEASE HAVE THE MODEL NUMBER AND SERIAL NUMBER AVAILABLE WHEN YOU CALL.** This information is printed on the labels on the sides of the device enclosure. If your call is made after business hours or on weekends, please leave your name, telephone number, the unit serial number, and a brief description of the problem. A Service Representative will call back at the earliest opportunity.

Distributor Service Number Here

MAINTENANCE

The ACS requires no periodic maintenance other than occasional cleaning.

Warning To reduce the risk of electrical shock or equipment damage, be cautious while cleaning the connectors and case.

1. Turn off your charge station at the circuit breaker before cleaning.

2. Clean your charge station using a soft cloth lightly moistened with mild detergent solution. Never use any type of abrasive pad, scouring powder, or flammable solvents such as alcohol or benzene.

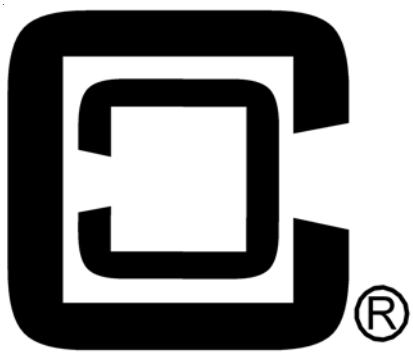
WARRANTY INFORMATION

ClipperCreek, Inc. warrants this product to be free from defects in material, manufacture and design for a period of one year after the date of purchase. If this product is defective in materials, manufacture or design during this warranty period, ClipperCreek, Inc. will, at its option, repair or replace the product. Repair parts and /or replacement products may be either new or reconditioned at ClipperCreek's discretion. This limited warranty does not include service to repair damage from improper installation, improper connections with peripherals, external electrical fault, accident, disaster, misuse, abuse or modifications to the product not approved in writing by ClipperCreek, Inc. Any service repair outside the scope of this limited warranty shall be at applicable rates and terms then in effect.

All other express and implied warranties for this product including the warranties of merchantability and fitness for a particular purpose, are hereby disclaimed. Some states do not allow the exclusion of implied warranties or limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

If this product is not as warranted above, your sole and exclusive remedy shall be repair or replacement as provided above. In no event will ClipperCreek, Inc., any of its authorized sales and service representatives, or its parent company be liable to the customer or any third party for any damages in excess of the purchase price of the product. This limitation applies to damages of any kind including any direct or indirect damages, lost profits, lost saving or other special, incidental, exemplary or consequential damages whether for breach of contract, tort or otherwise or whether arising out of the use of or inability to use the product, even if ClipperCreek, Inc. or an authorized ClipperCreek, Inc. representative or dealer has been advised of the possibility of such damages or of any claim by any other party. Some states do not allow the exclusion or limitation of incidental damages for some products, so the above limitation or exclusion may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which may vary from state to state.



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